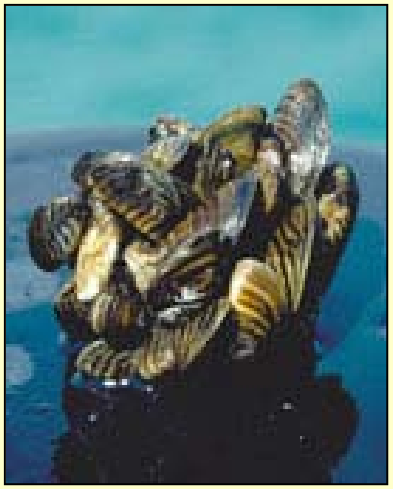
Zebra Mussels and the Pacific Northwest

Early Detection and Monitoring in the Western United States



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Center for Lakes and Reservoirs
Portland State University

Funded by: Pacific States Marine Fisheries Commission

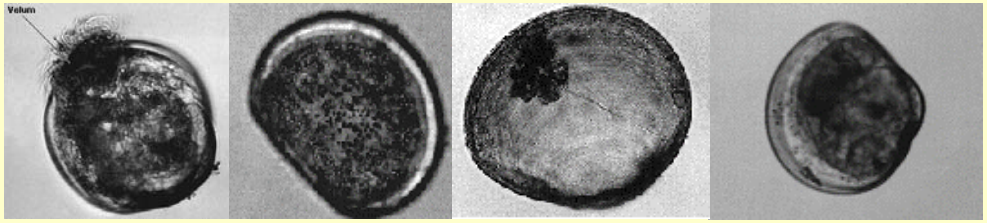
Zebra Mussel

Dreissena polymorpha

- Native to the Black and Caspian Seas
- Spread throughout Europe during 19thC
- First found in 1988 in Lake St. Claire
- Likely transported via ballast water

Biology

- Grow to 50mm in length
- Lifespan ~3 years
- Spawn at end of first year, 40k - 1 million eggs per season
- Free-swimming veliger larvae
- Spend ~1 month in the plankton
- Settle and attach to hard substrate via byssus



Biology cont.

- Optimal water temp 12ºC - 25ºC
- Prefer well oxygenated shallow waters
- Hard substrate settlement
- Avoid high velocity flow locations <1.5 m/sec
- Filter feeders, most populations in rivers are food-limited
- Filtration rate 1L/day

Ecological Impacts

Water transparency	increases
Organic matter	decreases
Primary production	decreases
Bacterioplankton	increase
Macrophytes	increase
Zooplankton	decrease
Zoobenthos	increase in detritivores
Fish	Decline in planktivores, increase in benthphagous spp.

Impacts on Unionids

- Native clams vulnerable to settlement
- Shell fouling can inhibit burrowing and movement
- May increase drag and likelihood of being dislodged
- Occlude openings and induce shell deformities
- Compete for food resources

Case Study:
Zebra Mussels and Hudson River

- Appeared in May 1991
- By September 1992, represented more than half of heterotrophic biomass
- Summer turnover rates 1-4 days
- 80% reduction in plankton biomass
- 70% reduction in zooplankton biomass
- Driving local extinction of native pearly mussels
- Decline in shad and herring, flourishing sunfish populations

Impacts of Biological Fouling

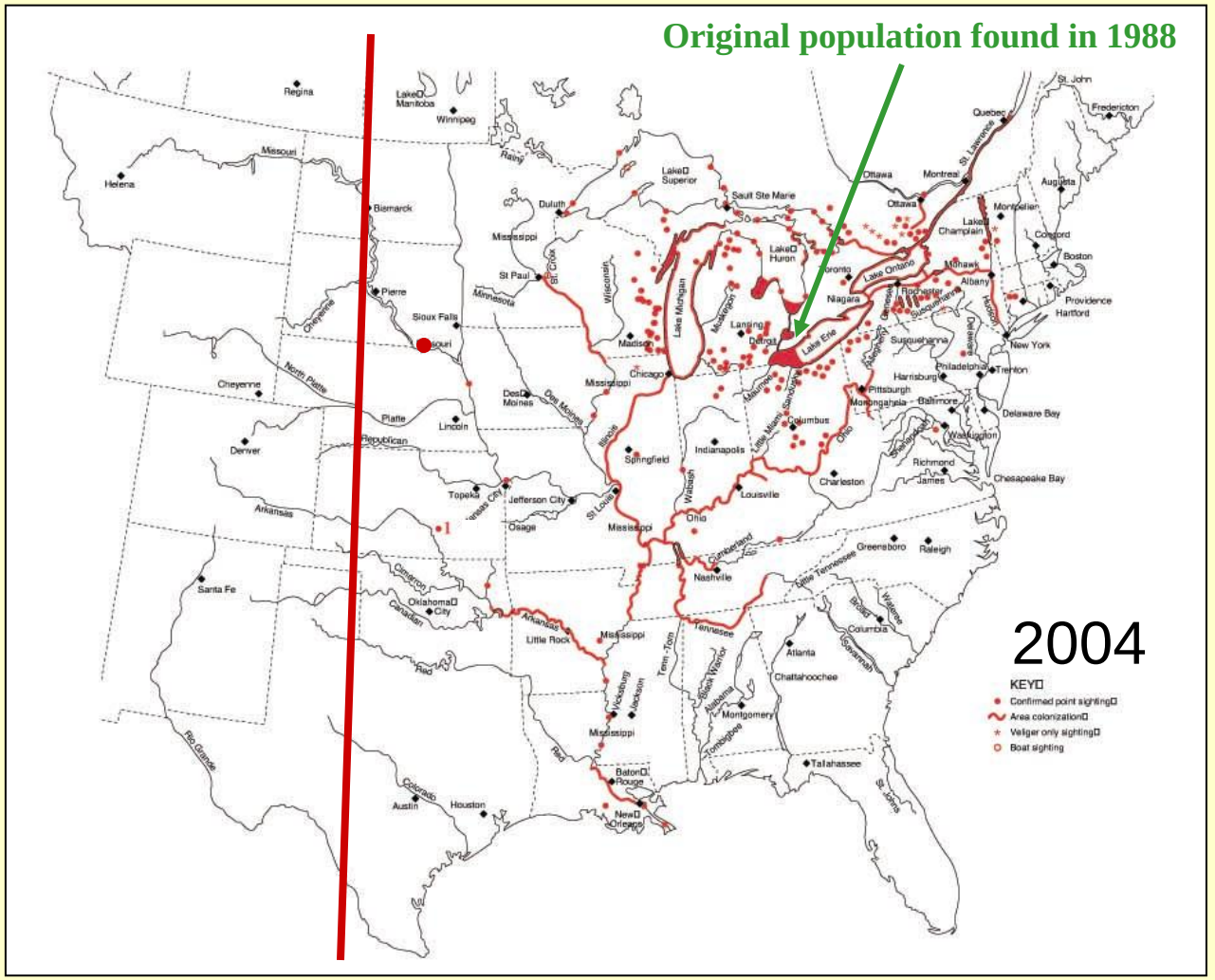
Economic Impacts

Filtration systems require cleaning every few months

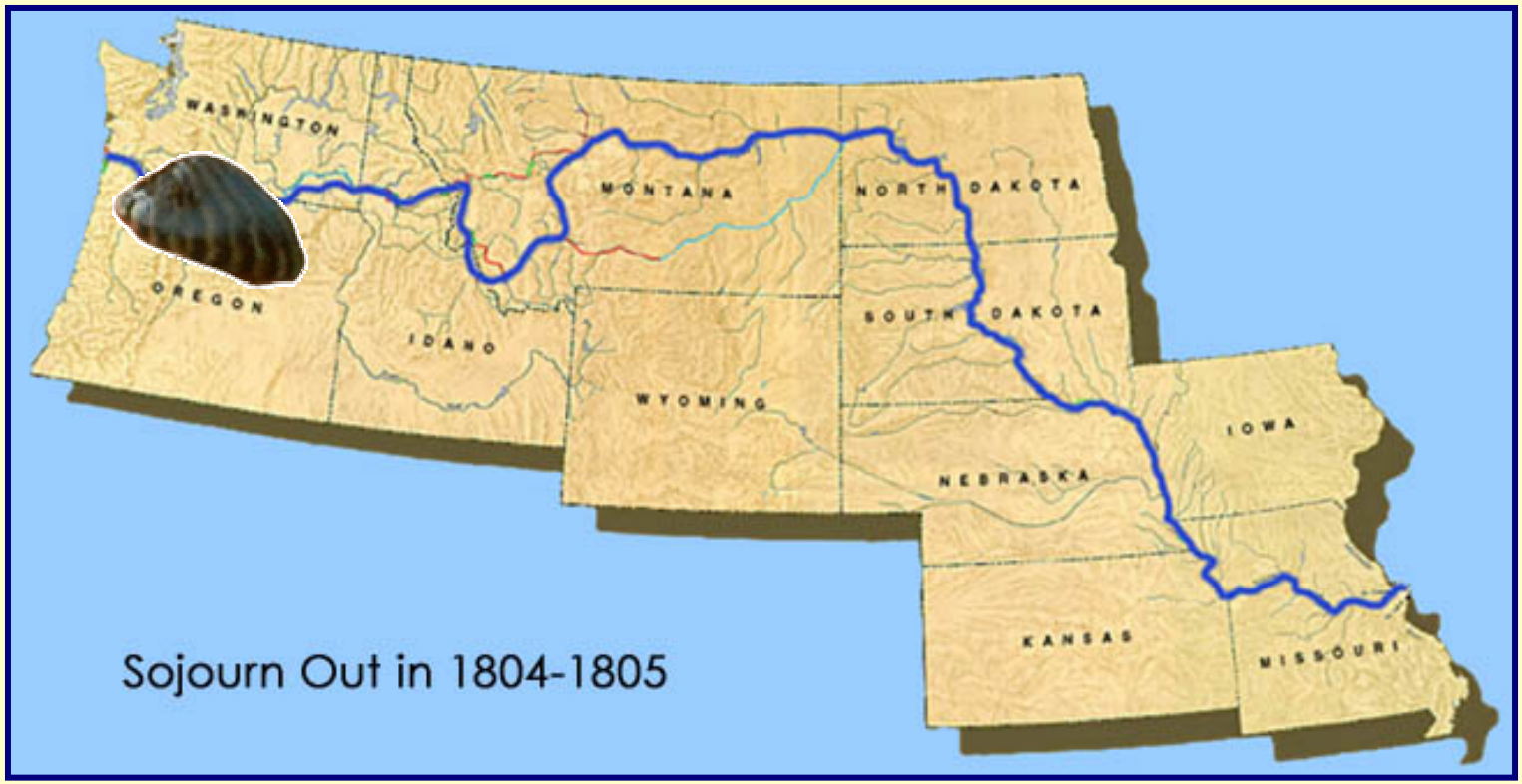
Countermeasures are costly

- Large-volume water users spend about $360,000 a year on zebra mussel control
- Nuclear power plants average an extra $825,000 in added expenses

100th Meridian Initiative



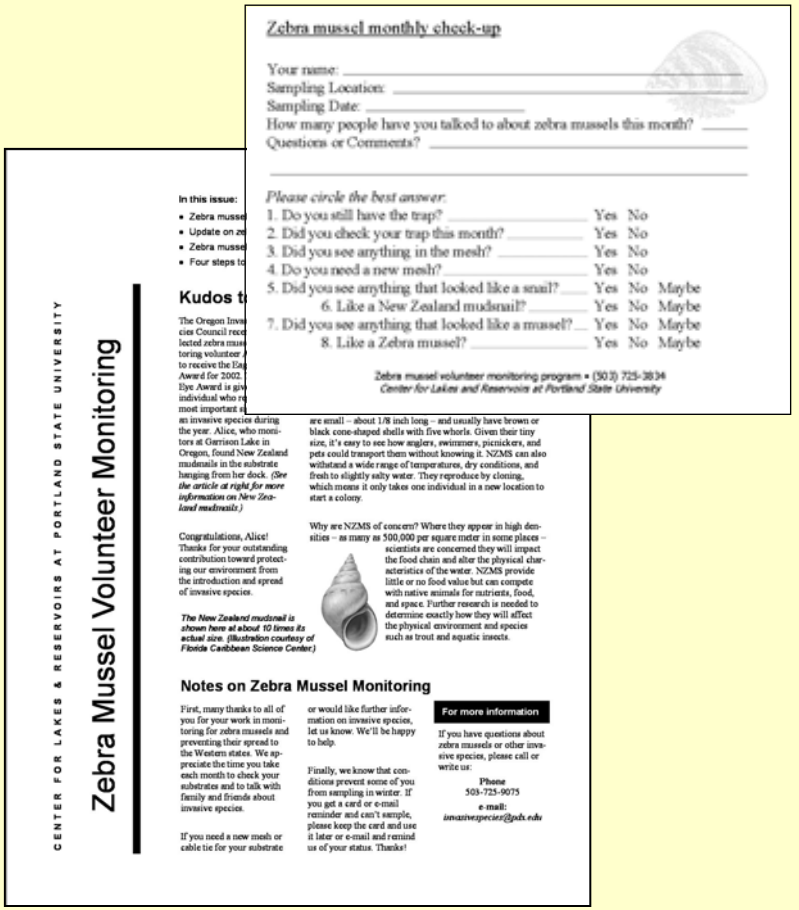
Lewis and Clark Bicentennial



Volunteer Zebra Mussel Monitoring

Early Detection:

- Sampling substrates
  - Monthly card or e-mail
  - Quarterly information update



Zebra mussel monthly check-up

Your name: _____
Sampling Location: _____
Sampling Date: _____
How many people have you talked to about zebra mussels this month? _____
Questions or Comments? _____

Please circle the best answer:

1. Do you still have the trap? Yes No
2. Did you check your trap this month? Yes No
3. Did you see anything in the mesh? Yes No
4. Do you need a new mesh? Yes No
5. Did you see anything that looked like a snail? Yes No Maybe
6. Like a New Zealand mudsnail? Yes No Maybe
7. Did you see anything that looked like a mussel? Yes No Maybe
8. Like a Zebra mussel? Yes No Maybe

Zebra mussel volunteer monitoring program • (503) 725-3834
Center for Lakes and Reservoirs at Portland State University

CENTER FOR LAKES & RESERVOIRS AT PORTLAND STATE UNIVERSITY

Zebra Mussel Volunteer Monitoring

In this issue:

- Zebra musse
- Update on ze
- Zebra musse
- Four steps to

Kudos t

The Oregon Inva
cies Council rec
lected zebra mus
toring volunteer
to receive the Ea
Award for 2002.
Eye Award is giv
individual who r
most important
as invasive species during the year. Alice, who monitors at Garrison Lake in Oregon, found New Zealand mudsnails in the substrate hanging from her dock. *(See the article at right for more information on New Zealand mudsnails.)*

Congratulations, Alice! Thanks for your outstanding contribution toward protecting our environment from the introduction and spread of invasive species.

The New Zealand mudsnail is shown here at about 10 times its actual size. (Illustration courtesy of Florida Caribbean Science Center.)

are small – about 1/8 inch long – and usually have brown or black cone-shaped shells with five whorls. Given their tiny size, it's easy to see how anglers, swimmers, picnickers, and pets could transport them without knowing it. NZMS can also withstand a wide range of temperatures, dry conditions, and fresh to slightly salty water. They reproduce by cloning, which means it only takes one individual in a new location to start a colony.

Why are NZMS of concern? Where they appear in high densities – as many as 500,000 per square meter in some places – scientists are concerned they will impact the food chain and alter the physical characteristics of the water. NZMS provide little or no food value but can compete with native animals for nutrients, food, and space. Further research is needed to determine exactly how they will affect the physical environment and species such as trout and aquatic insects.

Notes on Zebra Mussel Monitoring

First, many thanks to all of you for your work in monitoring for zebra mussels and preventing their spread to the Western states. We appreciate the time you take each month to check your substrates and to talk with family and friends about invasive species.

If you need a new mesh or cable tie for your substrate or would like further information on invasive species, let us know. We'll be happy to help.

Finally, we know that conditions prevent some of you from sampling in winter. If you get a card or e-mail reminder and can't sample, please keep the card and use it later or e-mail and remind us of your status. Thanks!

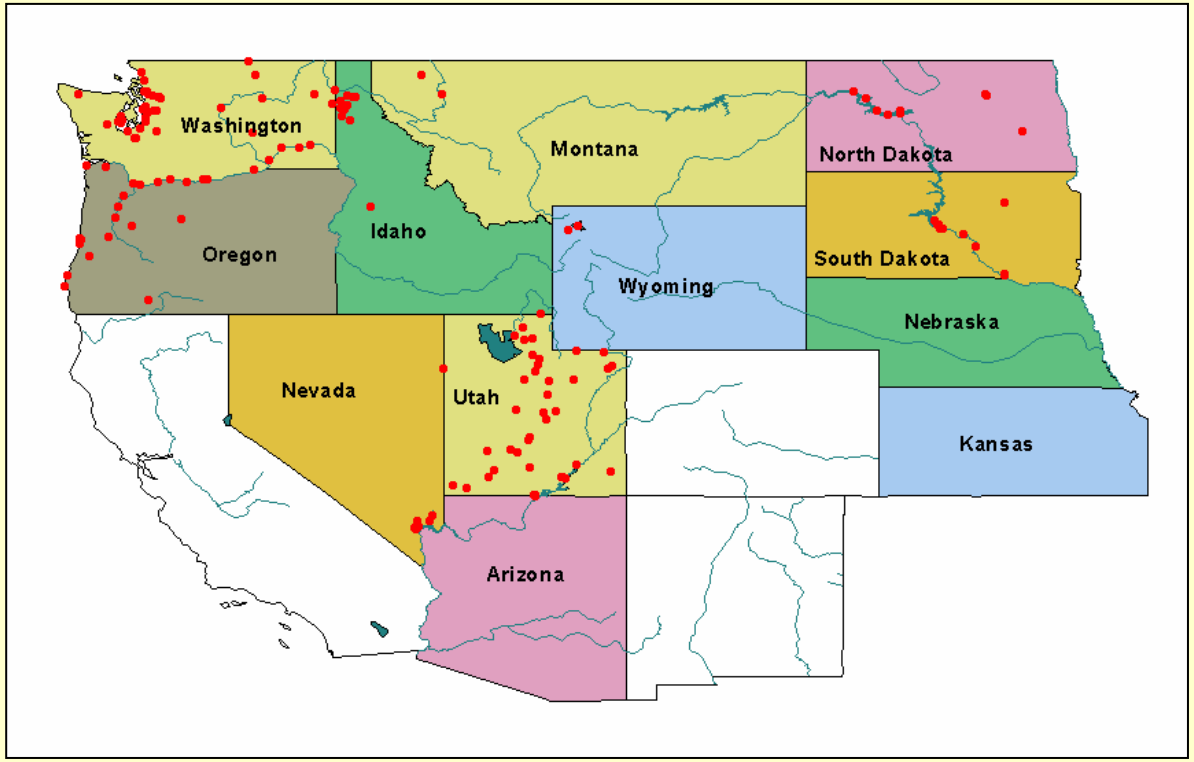
For more information

If you have questions about zebra mussels or other invasive species, please call or write us:

Phone
503-725-9075

e-mail:
invasivespecies@pdx.edu

Zebra Mussel Monitoring



Zebra Mussel Monitoring Sites – 2004
~160 substrates deployed

Monitoring Success

In July 2002 Alice Pfand, a participant in the Volunteer Zebra Mussel Monitoring Program discovered New Zealand mud snails in Garrison Lake, a coastal lake in Port Orford, OR, approximately 50 miles north of the California border.

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On the trail of a really bad snail

By Elise Hamner, City Editor

PORT ORFORD -- State officials say Alice Pfand has an eagle eye. More realistically, she seems to have a sixth sense for snails.

That snail sense proved to be the perfect trait for this volunteer invasive species hunter.

A year ago, Pfand started dangling a contraption made of plastic pipe stuffed with netting off her dock at Port Orford's Garrison Lake. She was an enlistee with the Zebra Mussel Monitoring Program. Pfand's professional contact Mark Sytsma, an associate professor at Portland State University who directs the Center for Lakes and Reservoirs, didn't really think Pfand would find the devastating zebra mussel.

Alice Pfand, 67, shows the trap she used to catch New Zealand mudsnails in Port Orford's Garrison Lake. The state recently awarded Pfand with its first Eagle Eye award for detecting the invasive species. The trap, a simple plastic tube with netting inside, provides the kind of habitat mudsnails find attractive.--Contributed Photo

And she didn't.

But, she did find two tiny something elses one day last summer and they were just as troubling.

"On July 3, I found two suspicious-looking snails in my trap. I photographed them and sent a picture off," she said.

Scientists were flabbergasted.

They called Pfand and asked her to send the actual snails. Sure enough, their fears were confirmed. Garrison Lake was home to New Zealand mudsnails and that was very bad news indeed for scientists.

"Within a few weeks, there seemed to be snails everywhere. They were all over the

OREGON INVASIVE SPECIES HOTLINE:

1-866-INVADER